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EXAMINER	
O'NEILL, KARIE AMBER	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/521,871	MINO ET AL.	
	Examiner	Art Unit	
	Karie O'Neill	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-14,17-26 and 28-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11-14,17-26 and 28-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1-21-05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The Preliminary Amendment filed on October 7, 2005, was received. Claims 1, 17-18, 25-26 and 28-29 have been amended. Claims 10, 15-16 and 27 have been cancelled. Therefore, Claims 1-9, 11-14, 17-26 and 28-33 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d) or (f), which papers have been placed of record in the file.

Information Disclosure Statement

3. Information disclosure statement (IDS), submitted January 21, 2005, has been received and considered by the examiner.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5, 7, 9, 12, 17-22, 24 and 28-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki (JP 2002-203576).

With regard to Claim 1, Suzuki discloses in Drawings 1 and 2, an electrolyte membrane having ionic conductivity, the electrolyte membrane (10) comprising: a porous base material (12), and organic molecules containing ion exchange groups; wherein the organic molecules are chemically bonded to the surface of the base material (12) to form an organic layer (14), and wherein ions are conducted via the ion exchange groups in the organic layer, wherein a plurality of through holes (12a) that pierce the porous membrane (12) in the direction perpendicular to the membrane surface are formed in the porous membrane (paragraphs 0024-0027); and wherein the organic molecules (14) are chemically bonded to the inner surface of the through holes (12a) to form the organic layer (paragraph 0037), wherein in the organic layer (14), a substance is further provided on the face of the membrane on the side opposite the face that is bonded to the base material (12) so a to fill gaps present in the inner portion of the through holes (12a) (paragraph 0028).

With regard to Claim 2, Suzuki discloses wherein the ion exchange groups include at least one type of functional group selected from sulfonic acid, carboxylic acid, phosphonic acid and phosphonous acid groups (paragraph 0040).

With regard to Claim 3, Suzuki does not disclose wherein the molecular weight of the organic molecules is 10,000 at most. However, such properties are inherent, given that both Suzuki and the instant application utilize the same materials. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. See MPEP 2112.

With regard to Claims 4 and 5, Suzuki discloses wherein the organic molecules (14) are chemically bonded to the surface of the base material (12) by a coupling agent and wherein at least one of the organic molecules is chemically bonded to an adjacent organic molecule (paragraphs 0041-0046).

With regard to Claim 7, Suzuki discloses, wherein the organic layer is a monolayer (paragraph 0102).

With regard to Claim 9, Suzuki discloses wherein the base material has at least one form selected from particles or fibers forming alumina filter paper, and wherein the electrolyte membrane includes an amalgamation of the base material which is penetrated with the ion conductivity substance (paragraph 0101).

With regard to Claim 12, Suzuki discloses in Drawing 1, wherein a surface of the base material (12) and the surface of the electrolyte membrane are perpendicular to each other because the surface of the base material is located in the communication holes (12a) which is penetrated at a right angle through the base material.

With regard to Claims 17-20, Suzuki discloses in paragraphs 0032-0035, the cross sectional area of the through holes (12a) that are cut in a direction that is parallel to the surface of the porous membrane (12) changes in the thickness direction of the porous membrane and contain fine holes that are open on both ends and connected to the through holes and surface of the membrane. For example, Suzuki discloses the communicating hole (12a) penetrating in the thickness direction of the base material (12) and the shape can be any of an angle below 90 degrees to the field of the film base material. The communicating hole (21a) can be a zigzag shape, circular, ellipse, a

polygon and connects to the surface of the membrane or through holes in the shape of a gourd or star.

With regard to Claims 21 and 22, Suzuki discloses the material being any of a polymer material, inorganic material and a complex of inorganic and organic material (paragraph 0036). Specifically, the base material is an alumina membrane (paragraphs 0036, 0101).

With regard to Claim 24, Suzuki does not disclose wherein the specific surface area per unit volume of base material is at least 100 m^2/cm^3. However, such properties are inherent, given that both Suzuki and the instant application utilize the same materials. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. See MPEP 2112.

With regard to Claims 28 and 29, Suzuki discloses wherein the substance is a water-repellent hydrophobic layer and the substance is a polymer of at least one type of material selected from organic material of fluorine (paragraph 0028).

With regard to Claims 30-32, Suzuki discloses in Drawing 2, a fuel cell (20), comprising: an electrolyte membrane (30); a cathode electrode (40b); and an anode electrode (40a); wherein the electrolyte membrane (30) is held between the cathode electrode (40b) and the anode electrode (40a); and further comprising a fuel supply portion to supply fuel to the anode electrode, and an oxidizing agent supply portion to supply an oxidizing agent to the cathode electrode, wherein the fuel includes at least one type of gas selected from hydrogen (paragraphs 0052-0059).

6. Claims 1-9, 12, 21-26 and 28-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamaguchi (JP 2002-083612).

With regard to Claim 1, Yamaguchi discloses in Drawings 2 and 3, an electrolyte membrane having ionic conductivity, the electrolyte membrane comprising: a porous base or substrate material (1), and organic molecules (3) containing ion exchange groups, called a 1st polymer; wherein the organic molecules (3) are chemically bonded to the surface of the base material (1) to form an organic layer, the surface of the base material being the inner surface of the pores (2), and wherein ions are conducted via the ion exchange groups in the organic layer, wherein a plurality of through holes or pores (2) that pierce the porous membrane base material (1) in the direction perpendicular to the membrane surface are formed in the porous membrane (paragraphs 0034-0036); and wherein the organic molecules (3) are chemically bonded to the inner surface of the through holes (2) to form the organic layer (paragraphs 0038, 0057), wherein in the organic layer, a substance (5), called a 2nd polymer, is further provided on the face of the membrane on the side opposite the face that is bonded to the base material (1) so a to fill gaps present in the inner portion of the through holes (2) (paragraph 0058).

With regard to Claim 2, Yamaguchi discloses wherein the ion exchange groups include at least one type of $-SO_3$ or $-SO_3H$ (paragraph 0037).

With regard to Claim 3, Suzuki does not disclose wherein the molecular weight of the organic molecules is 10,000 at most. However, such properties are inherent, given

that both Yamaguchi and the instant application utilize the same materials. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. See MPEP 2112.

With regard to Claims 4 and 5, Yamaguchi discloses wherein the organic molecules (3) are chemically bonded to the surface of the base material (1) by a coupling agent and wherein at least one of the organic molecules is chemically bonded to an adjacent organic molecule (paragraph 0038).

With regard to Claim 6, Yamaguchi discloses wherein the thickness of the organic layer, made up of the substrate (1) and the organic molecules (3), is 100 micrometers or less (paragraph 0035), which encompasses the range of at least 0.1nm to at most 500nm.

With regard to Claims 7 and 8, Yamaguchi discloses, wherein the organic layer is a monolayer, or more than two layers may be used when using a composite material (paragraph 0034).

With regard to Claims 9 and 21-23, Yamaguchi discloses wherein the base material (1) has at least one form selected from particles or fibers of glass, alumina or silica with an inorganic material, and wherein the electrolyte membrane includes an amalgamation of the base material (1) which is penetrated with the ion conductivity substance (3) (paragraph 0034).

With regard to Claim 12, Yamaguchi discloses in Drawing 2, wherein a surface of the base material (1) and the surface of the electrolyte membrane are perpendicular to

each other because the surface of the base material (1) is located in the pores (2) which is penetrated at a right angle through the base material making it perpendicular to the surface of the membrane as a whole.

With regard to Claim 24, Yamaguchi does not disclose wherein the specific surface area per unit volume of base material is at least 100 m^2/cm^3. However, such properties are inherent, given that both Yamaguchi and the instant application utilize the same materials. A reference which is silent about a claimed invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. See MPEP 2112.

With regard to Claim 25, Yamaguchi discloses wherein when the porosity of the base material is € (volume %) and the average diameter of the through holes is d (nm), € and d satisfy the relationship given by (4 × €) / d > 10. Yamaguchi discloses in paragraph 0035, the porosity of the base material is 10% to 95% and the diameter of through holes is 100μm or less, which means that Yamaguchi will satisfy the equation (4 × €) / d > 10 when, (4 x 10%)/ 1nm= 40 >10.

With regard to Claim 26, Yamaguchi discloses wherein when the porosity of the base material is € (volume %), and the average tortuosity of the through holes is Ŧ, Ŧ and € satisfy the relationship given by € / $Ŧ^2$ < 20. Yamaguchi discloses in paragraph 0035, the porosity of the base material is 10% to 95% and the tortuosity would be 1 since the through holes are vertical, therefore, the relationship € / $Ŧ^2$ < 20 would be satisfied by 10/1=10 <20.

With regard to Claims 28 and 29, Yamaguchi discloses wherein the substance, or 2nd polymer (5), is water-repellent and the substance is a polymer of at least one type of material selected from organic material and inorganic material and can be the same or different than the 1st polymer material (paragraphs 0034-0041 and 0052-0056).

With regard to Claims 30-33, Yamaguchi discloses in Drawings 4 and 5, a fuel cell (11), comprising: an electrolyte membrane (17); a cathode electrode (13); and an anode electrode (15); wherein the electrolyte membrane (17) is held between the cathode electrode (13) and the anode electrode (15); and further comprising a fuel supply portion to supply fuel to the anode electrode, and an oxidizing agent supply portion to supply an oxidizing agent to the cathode electrode, wherein the fuel includes at least one type of gas or liquid selected from hydrogen or a hydrocarbon, specifically the fuel being methanol (paragraphs 0060-0064).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 11 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki (JP 2002-203576), as applied to Claims 1-5, 7, 9, 12, 17-22, 24 and 28-32 above and unpatentable over Yamaguchi (JP 2002-083612), as applied to Claims 1-9, 12, 21-26 and 28-33 above, and in further view of Yamada (US 5,213,910).

Suzuki discloses an electrolyte membrane in paragraph 5 above and Yamaguchi discloses an electrolyte membrane in paragraph 6 above, but neither reference discloses wherein the base material has a folded film shape, the base material is wound up, and the base material is folded into an accordion shape.

Yamada discloses in Figures 8-10, a solid electrolyte type fuel cell including two plate-shaped solid electrolyte type fuel cell elements formed with a plurality of recesses, a three layer structure (11, 21, 31) consisting of a fuel electrode film (12, 22, 32), a solid electrolyte film (13, 23, 33) and an air electrode film (14, 24, 34) provided with a trapezoid cross-section or a folded film shape (Fig. 8), formed as a whole wave-shaped element or being wound (Fig. 9) and formed in a zigzag or accordion fashion (Fig. 10) (column 6 lines 59-65, column 7 lines 15-16, 24-25). Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to use a base material of the electrolyte membrane of Suzuki and Yamaguchi in a folded shape, wound up and in an accordion shape, because Yamada teaches that fuel, oxidant and temperature distribution is uniform allowing the fuel cell to operate for a longer period of time and improve the electric power generating efficiency (column 8 lines 11-17).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571)272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Karie O'Neill
Examiner
Art Unit 1795

KAO

/Mark Ruthkosky/
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